EXECUTIVE SUMMARY

This Phase III report of the interagency "Wildland Firefighter Safety Awareness" project presents over 200 recommendations for improving the organizational culture, leadership, human factors and external influences that affect wildland firefighter safety. Together they are a set of detailed implementation strategies for meeting the 85 goals for improving firefighter safety that were developed in Phase II in response to the problems and solutions suggested by the 1,000 wildland firefighters surveyed in Phase I, plus one goal added in Phase III.

Background

The five Federal agencies most involved in wildland firefighting – the Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service – chartered a study in 1995 to identify and change aspects of the underlying organizational culture that negatively impact firefighter safety. The study was undertaken by an outside consulting firm, TriData Corporation of Arlington, Virginia. This report summarizes the results of the third phase of the study – implementation recommendations.

In the first phase of the study, over 1,000 wildland firefighters provided us with their personal observations on the factors that affect safety, and their recommendations for improvements. This was done through in-depth, one-on-one interviews or focus groups involving 300 firefighters, and from responses to a 25-page survey form from another 700 firefighters.

We also searched the literature on wildland firefighting safety and related safety fields for insights and ideas, and interviewed many experts in wildland firefighting and safety research.

The issues identified ranged from detailed problems such as the lack of adequate distribution of radios to some Type II crews, and the dangers of transporting crews in school buses driven recklessly on mountain roads, to broader organizational culture and leadership issues such as lack of adequate leadership training, lack of adequate two-way

dialogue in communications, a lack of incentives (and even disincentives) for experienced firefighters to return each year, inadequate training to compensate for the drop in experience, and many, many other factors. We heard comments like the following:

> *We understand the science of fighting fires, but we do not understand the science of people fighting fires.*
>
> *Fatigue is a particular problem on campaign-type fires…It creates the walking dead.*
>
> *One in five division supervisors is really scary.*

The Phase I report described in detail the wide range of problems found, and the weighting of their importance.[1]

The second phase of the study started with the problems and solutions identified in Phase I, and developed a set of 85 goals that taken together describe the desired wildland firefighter culture of the future.[2]

The third phase of the study, described in this report, developed specific recommendations on how to move from the current situation to the desired future culture. Firefighting is an inherently dangerous undertaking that cannot be made risk-free. However, we are not doing a good enough job of managing the risks, and avoiding putting people into situations where entrapment or serious injury may occur. Together the recommendations here respond to virtually all of the safety concerns identified in Phase I. The results of this study provide the tools to make the culture of wildland firefighting a self-learning, self-correcting system.

In the following pages we first discuss an overall framework for change, and then summarize what were felt to be some of the most important areas and specific ideas for implementing change. The full list of goals and the recommended implementation strategies for each are provided at the end of the Executive Summary. We urge those

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[1] *Wildland Firefighter Safety Awareness Study –Identifying the Organizational Culture, Leadership, Human Factors, and Other Issues Impacting Firefighter Safety*, October 1996.
[2] *Wildland Firefighter Safety Awareness Study – Setting New Goals for the Organizational Culture, Leadership, Human Factors, and Other Areas Impacting Firefighter Safety*, February 1997.

interested in safety to read the entire report because many of the findings are interrelated, and there are so many needed improvements across so many topics that it is difficult to summarize them without overgeneralizing. The old saying "the devil is in the details" applies here.

A Framework for Culture Change

The ***culture change process*** is a two-sided coin. On one side is the "bottom-up" phenomenon that many changes arise from those actually doing the work. On the other side is the "top-down" reality that changes in conducting business often get made by direction or sanction from top management. Both are essential. People at all organizational levels need to be on board since workers can resist change ordered from the top or management can stifle change started at the bottom. Changing the organizational culture as it relates to wildland firefighter safety will require commitment at every organizational level. Gaining that commitment will take a concerted, systematic effort to involve people from all levels in determining the details of the strategies to be pursued.

A second issue in determining cultural change is the role of ***leadership***. Cultural change is not triggered by a magic bullet or a directive. Rather, culture is changed by a series of small steps taken by the leading members of the culture at all levels. Leadership is standing up and leading the way. It is behavior and it is demonstrable. It is showing, not telling. Both sides of the change process offer opportunities for leadership – from management and from firefighters and supervisors. Changing the way business is conducted requires people at all levels to lead by personal example in demonstrating new approaches to achieve safer operations. Management must solicit and support suggestions on ways to improve operations; the process cannot be delegated to a committee. Management must demonstrate its willingness to make positive changes, whether they are initiated by management or by firefighters.

A third major issue in this cultural change process is ***accountability***. One of the strongest cries heard during the Phase I interviews of this study was to strengthen accountability at all levels of the organization – firefighters, Crew Supervisors, fire managers, and up. The truly remarkable aspect of that cry was that it did not just point fingers at some vague group of "others," "them," or "management." Rather, five of the

six top safety issues identified by firefighters focused on personal firefighter actions. All ranks were represented on the survey, and there was excellent consensus that change required strong accountability throughout the wildland firefighting system to make it work well. Accountability is not just something to be applied to workers; managers must be held accountable for safety-related decisions, too.

How do the agencies accomplish this? Vigorously evaluate performance. Have ramifications for safety violations. Hold Agency Administrators and directors accountable for their budget, policy, human resource/personnel and programmatic decisions. Continue to address competency problems. Recognize the difference between competency problems and "safety violations" and handle them differently (but handle both quickly and affirmatively). Both "the system" and individuals must hold people accountable for safety requirements.

Wildland firefighting (and emergency response in general) occurs within a context of great uncertainty. There are many hazards to consider. One never is sure when the wind will suddenly shift, or when multiple fires will occur simultaneously, or a tree limb will fall. Fire behavior and fireline safety result from the interaction of many conditions and events. Outcomes of individual and collective actions then, are not evaluated against a single initial objective. They are evaluated against less precise criteria, such as how well individuals, crews, and teams expect the unexpected and prepare for the unanticipated.

The major cultural change needed is to foster a fireline safety culture that has situational awareness and risk management at its core. What does that look like? In the desired culture people maintain constant, updated awareness of their working environment; collect and synthesize information as a team, *and* rely on strong leadership to recognize danger, make decisions that are "primed' by their situational awareness, and mitigate risks rather than "working through them" or ignoring them.

At the operations level, people need to step forward and recognize their own accountability for actions, whether accidents, near misses, or successes. Increased self-awareness and reporting of observed safety problems make safety learning possible.

At the management level, the accountability issue is slightly different. The management perspective focuses on performance of people as teams, as staff, in the aggregate. The willingness to review performance for outcomes must be demonstrable. They must look at accidents, near misses, and successes, and analyze why they happened. Then management must be willing to publicly recognize, correct, share, or (for successes) encourage what they uncovered.

Accountability in the sense it is described here cannot be delegated. The intent of taking such a perspective is to get all the players – workers concerned with outcomes from individual behaviors, and managers concerned with outcomes from collective behaviors – into a context of objective accountability.

As you finish this summary and read the report, review the various topics and recommendations through a filter of the principles discussed above. Consider each of the issues in terms of your place in the change process, in terms of your leadership role, whatever your position, and in terms of how you personally can practice accountability.

Highlights of Recommendations

The most important ideas for changing the wildland firefighting culture in the United States in a way that would improve safety may be grouped into the following categories: leadership (including risk management), retention of experience, improved training and certification, human communications, human factors, professionalism and attitudes about safety, safety incident reporting, and external factors (especially prevention). For each category we identified a major principle or "pillar of wisdom," a set of goals, and specific recommendations for implementation.

The description of recommendations here and in the body of the report is necessarily sequential, though many of the recommendations would be implemented in parallel and are highly interrelated.[3] As mentioned earlier, the full list of recommended

[3] An attempt to diagram the complex interrelationships of the many areas needing improvement was provided in the Phase II report.

implementation strategies, with priority rankings, is at the end of this summary. Virtually every strategy will be a continuing process, not a unique, one-shot project.

The selection of priorities and development of an action plan to implement the recommendations here is the prerogative of the five agencies. We indicate below with asterisks the actions that our project team would start with by the next fire season. All of the following recommendations are important; it is less critical which to address first than to address all over the next few years.

Strengthen Leadership

Leadership of crews, divisions, Incident Management Teams and other resources is possibly the most critical factor in safety. Many people in leadership positions have not been trained in leadership skills and human relations, as opposed to the technical side of their jobs, and some are poorly suited to lead or supervise. There are some critical improvements needed in leadership selection and training to enhance safety.

Principle #1 – Assure that people in leadership positions are qualified.

- ***Screen potential leaders –*** Some people should not be or cannot be firefighters or fire leaders. If they do not have both the competence and suitability they need to be weeded out if they cannot be trained. There was a surprisingly strong call from all position levels surveyed in Phase I for screening potential supervisors and existing supervisors up for promotion as to their leadership ability as well as technical knowledge. This is widely done in the local career fire service using interviews, in-box exercises, multi-perspective assessments and psychological tests. Screening should be done at every level of supervisory positions.

- ***Require stronger fire qualifications for FMOs and other managers –*** Agencies must not assign employees to key fire management positions if they do not meet interagency and agency-specific competencies and qualifications. Training to competency while holding the job is not safe, and should not be permitted. We recommend development of minimum fire qualifications and competencies for people assigned to be Fire Management Officers (and equivalent positions). There

are several tiers of FMO positions and it is a critical position at every level. The FMOs have duties that affect employee and public safety. They help plan the fire program and often have line or advisory roles at fires.[4] Fire management courses also should be required for all fire management officials; specific courses are recommended in the text.[5]

- ***Train all Agency Administrators in fire management basics –*** Agency Administrators do not need to be expert in firefighting but must have some minimum knowledge and competencies in fire management – how it works, where the dangers are, the basics of strategy and tactics. There has been considerable progress in raising their awareness about fire management issues through the improved Agency Administrator courses taught at the National Advanced Resource Training Center at Marana, Arizona, and at the geographic area level. The courses should continue to be improved and should be given to all Agency Administrators because of their influence on strategy and budget allocation decisions, and hence on safety. Agency Administrators must understand where their desire to protect resources could lead to asking firefighters to do something that is not safe with the available resources.

- ***Train for decision-making under stress –*** Leaders must be explicitly trained to operate under a variety of stresses, such as noise, heat, time demands, potential for failure, and outside pressures. There are many proven techniques for conducting this training. Appendix C presents a package of techniques called "Decision Skills Training." It includes a decision requirements exercise, tactical decision games, decision critiques, "pre-mortem" exercises, uncertainty management, situational awareness calibration, and a "commander's intent" communication exercise. The good news is that training people under one type of stress tends to carry over to operating under other kinds of stresses.

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[4] These changes for FMO positions and equivalents are already planned for implementation, by about June 1998.

[5] The Federal Fire and Aviation Leadership Council (FFACC) approved a revision of training requirements for fire management at various levels in February 1998, as this project phase was being completed.

- ***Increase situational awareness and prepare to handle the unexpected –*** Leaders need to be trained and encouraged not just to follow a long list of rules by rote, but to maintain situational awareness, use a risk management approach, and to be prepared to handle the unexpected. Having to deal with the unexpected should be expected. The skills to do this can be developed in part through the decision training noted above, but there also needs to be an expectation levied by managers that people will use their judgment effectively. There needs to be situational awareness at the strategic and management levels as well as at the firefighter/Crew Supervisor level. Better, well-screened information should be provided through new technology to improve situational awareness (e.g., better aerial imagery of the fire situation, better tracking of where each crew is.) Leadership training needs to make clear how a series of small oversights, errors or lack of information can build into a disaster. There are many examples, e.g. the Dude and South Canyon fires.

Principle #2 – Promote accountability for safety at all levels.

* [6]***Promote accountability through appropriate penalties and performance evaluations –*** As noted earlier, there was a very strong feeling from all ranks surveyed that those who make serious errors in judgment or disregard safety should be held accountable. Managers as well as firefighters must be held accountable. Certainly there should be "due process," when safety incidents occur, but in the meantime, individuals should be put on administrative leave or returned to a non-fire job while a casualty, entrapment, or near miss is investigated. (This is similar to what happens when a police officer discharges a weapon, or a pilot has an accident.) If a serious safety violation was committed, the accountability might include remedial training, being required to work under a "coach" on one's next assignment, being demobilized, having one's qualification level reduced, suspending or revoking one's red card, or even suspension from firefighting for a week, a season, or permanently, depending on the severity of the offense. Sending

[6] As noted above, asterisked items are those the project team felt should be implemented or at least started by the next fire season.

someone home from a fire for a safety violation and then immediately reassigning him or her to another fire should never be done. Accountability also can be promoted by routine performance measurement, using elements of the Position Task Books and people's success in managing risk as part of fireline performance evaluations.

- ***Set objectives, strategy and tactics for fires commensurate with available resources*** – Practice risk management at the highest levels. Don't pressure firefighters to make up for shortage of resources. Rather, be flexible and revise strategy and tactics to fit the available resources. Policy calls for this to be done, but it is not always observed in practice under a variety of pressures.

- ***Resist political pressures –*** Agency Administrators sometimes receive political pressure to fight fires in ways that may not be consistent with the resources available or with safety principles. The Agency Administrators must be backed by senior agency officials in resisting these pressures, and must not sacrifice safety for expediency. Agency Administrators must know their jobs are secure if they resist such pressures, and if they think safety, not politics. That can be achieved in part by having clear policy statements that they follow, and by disseminating examples of instances where resistance had positive rather than adverse consequences.

- ***Gain Agency Administrator support for changes in the culture –*** Most firefighters are willing to try to achieve goals in the face of adversity, sometimes beyond what is safe with available resources. Agency Administrators can send the wrong message by requiring an Incident Management Team to stick with an untenable strategy (e.g., ordering that a fireline must be held to protect resources, or that a particular strategy must be used that is not reasonable with the available resources). The Agency Administrators not only have to be on board the safety program, but must help remind firefighters to operate prudently and professionally, and to exercise accountability. Support from Agency Administrators is critical for implementing the recommendations here; it would be difficult to proceed with changing the culture without these key leaders lending a sense of urgency to the process.

- ***Make safety a year-round, day-in/day-out practice in the workplace*** – How one thinks and acts about safety on one's non-fire job and one's life outside of firefighting may well influence attitudes during firefighting (and vice versa). For people who fight fires as collateral duty as well as for dedicated full-time firefighters, leadership should give attention to safety on-the-job year-round, adhere to OSHA regulations, and promote safety in other ways, day in and day out, not just in an emergency.

Retain Experienced Personnel

A major negative factor in the wildland firefighting culture has been the loss of much firefighting experience through retirements, employee cutbacks across all disciplines, loss of motivation, and disincentives to continue in fire duty, especially in supervisory and management team positions. Collateral duty firefighters who return to a desk overflowing with backed up work are less willing to repeat the experience. The reduced numbers of experienced firefighters and fire managers has led to assigning some people two or three jobs, substituting with unqualified people, or leaving some tasks undone. Experience relates to safety in many ways, most directly through providing a wealth of knowledge and expertise for making decisions in the field under stress, being able to deal with uncertainty, and recognizing when events don't follow expected patterns.

Principle #3– Rebuild the level of firefighting and fire management experience.

- ***Improve retention incentives and reduce disincentives –*** The overall societal culture has changed. Working for what is perceived as unfair pay is no longer accepted. Retention of experienced firefighters (especially Crew Supervisors) and those in decision-making fire management positions must be encouraged, with appropriate pay incentives and promotion possibilities; giving them adequate recognition (e.g., certificates, pats on the back, feature articles, their pictures in the media); removing disincentives (e.g., pressures from their home supervisor); and treating firefighters as professionals. People in key positions (e.g., FMOs) should be dissuaded from becoming "early outs".

- ***Tap the unused experienced talent pool –*** Some experienced fire management talent has been lost because people stopped wanting to be involved in the fire program. Get some of this talent back into play by restoring the idea that fire is an agency mission, not just the fire program's mission. Virtually everyone can contribute somehow.

- ***Develop a strategic human resources plan and fill the pipeline with new talent –*** The pipeline of people in development for higher positions needs to be kept filled with apprenticeship programs and other means to replace the experience being lost. To do this there must be a human resource plan with long-term and short-term goals. The number of qualified, experienced people available for each position needs to be tracked. There needs to be a nested system of staffing targets for various units and geographic areas/regions that are coordinated in an interagency national plan.

Improve Training

Another major strategy for filling the experience gap is to improve the realism and field-relevancy of training through a variety of training approaches: on-the-job training, simulations, field exercises, and more visual, more hands-on training.

This study also identified a wide variety of problems in the existing training programs, as good as they are. In part, the problems are omissions: lack of adequate training for seasonals, lack of training in human relations skills and leadership; and lack of adequate decision training. There also are quality control problems, especially the variation in quality and training of instructors.

Principle #4: Realistic, high quality training must be used to compensate for lack of experience. Proper training also is critical for safety by teaching safe practices and developing proper attitudes.

* ***Foster on-the-job training*** – A critical, required change in the culture is to foster mentoring of younger firefighters and Incident Management Team members by the more experienced members. This can be done by teaching the mentors how best to

do on-the-job training (OJT), and adjusting how work is done to provide the opportunity to deliver OJT. Recent research has proven that mentors can be trained to improve their delivery of on-the-job training. There is a set of about 50 skills to significantly speed up the process of transferring knowledge. For example, rather than telling the crew members what to do, a Crew Supervisor experienced in OJT finds the "teachable moment" to ask the crew how they would do it, then discusses the chosen rationale (when there is time to do so, of course). This mini-drill often can be done quickly, and speeds the overall learning process. It also presents an opportunity for someone on the crew to point out to the Crew Supervisor a dangerous situation that might not have been realized by the supervisor. OJT can be used at every level in the organization. Appendix B amplifies the discussion in the body of the report on implementation of an OJT program.

- ***Make training more realistic –*** Realistic training can in part substitute for experience. In some cases it can provide knowledge through simulated experience that is not possible in the real world (just as a flight simulator can train pilots for violent maneuvers). Realistic training may involve virtual reality using sophisticated computer simulations, but training realism can also be increased by lower level computer simulations, by taking some training outside, and by appropriate paper and pencil exercises conducted under stress in real time (all of which are already being done to some extent.) Among the most critical areas needing more realistic training are size-up, situation awareness, decision making, and management of risk exposure. Deployment of fire shelters also needs to be taught under realistic conditions (wind, rough terrain); it is being done by some but not all trainers.

- ***Provide more refresher training, especially for seasonals –*** Although policy requires that annual refreshers be given, budgetary pressures and other tasks often cause the "season" for seasonal firefighters to be shortened at the front end, which may eliminate part or all of their fire training. Mandatory non-fire training also reduces time for fire training for various personnel. It is critical to refresh all crews with safety information at the beginning of each season, and at other opportunities. To make refresher training most effective requires analysis of the most important skills or procedures that get forgotten the most from season to

season, and then targeting the training to these greatest needs. Priority should be given to training those most likely to be on the fire line (including managers and supervisors). More broadly, there is a need for refresher training to be conducted for all operational personnel. This can be done with a combination of on-the-job training and mini-training sessions.

* ***Use more case studies, interactive exercises, and visual materials; critique actions and disseminate "lessons learned" –*** A better job is needed in undertaking reviews and debriefings after action. Most importantly, a place needs to be established to send good, positive lessons and then disseminate them. The U.S. Army has developed a "Center for Lessons Learned" that collects case studies, screens and digests them, and quickly disseminates key lessons and edited case studies. Harvard Business School professors think it is a superior and transferable approach to ensure that both positive and negative lessons learned from field experience and training exercises get saved, processed, and promptly disseminated to the field. It is credited with providing feedback to make a first-rate organization even better, and not rest on its laurels as times change. Appendix A discusses how to establish a Safety Center for Lessons Learned that can be a source of case studies and other realistic training materials.

* ***Use a newsletter and other means to spread positive and negative lessons –*** Storytelling is an intrinsic part of the wildland firefighter culture. Advantage should be taken of that in promoting success stories as well as examples of failures. The "story" of the tragedy at Storm King Mountain in which 14 wildland firefighters lost their lives helped stimulate a great deal of positive safety behavior.

  In aviation safety circles, there are brief newsletters that circulate to all levels of the organization, and provide anecdotes about safety issues, humorous stories, and good lessons from operations or simulations. Something similar is needed for the wildland firefighter, especially during the fire season to reach the maximum numbers. The newsletter can be developed by an editor using desktop publishing software, which makes it inexpensive to do. This newsletter might be a product of the proposed Center for Lessons Learned, or an offshoot of existing publications.

Its dissemination must be very wide at the firefighter level.[7] Dissemination can be by a variety of means, including distribution directly to camps and incident bases and by Internet.

Selected stories (case studies on lessons learned) need to spread verbally as well as by newsletter, as part of on-the-job training and informality, since some firefighters will not have access to newsletters or may not read them.

One of the key tasks of the stories is to make the inconceivable conceivable. It is hard for people to imagine that there can be a series of small steps, or a confluence of unfortunate events, that will lead to an entrapment or a fatality, yet those situations occurred repeatedly in the past.

Ensure Adequacy of Certifications and Qualifications

The red card qualification system must have integrity and must be an inviolate symbol of the culture. Between grandfathering-in some people not qualified, and signing off on others whose experience is not adequate, the red-card has deteriorated as the symbol of competence and integrity. There also is wide concern about the qualifications of a small fraction of leaders and fire managers who do not have adequate fire background and who can profoundly affect safety; this was addressed under leadership training.

Principle #5 – Ensure the integrity of the red card qualifications system.

- ***Enforce the requirements of the certification system*** – The present red card system can work if properly enforced and if the requirements at each level are properly interpreted. Improperly signing off on a red-card qualification, or

[7] Emergency Firefighters (EFFs), a special hiring category, will be more difficult to reach for this approach and a number of other recommendations in this report. Special attention needs to be given to how the various ideas here can be adapted to the needs of the EFFs, who comprise a significant portion of the basic firefighter workforce.

falsely representing your qualifications or those of the people you supervise must be a grave offense with serious consequences.

Improve the Human Side of Communications

Communications are critical to safety. A common finding in firefighter fatality and serious injury incidents is a failure to provide adequate warnings, or lack of clarity about desired operations. One of the most important changes needed in the culture is to promote two-way communications – a dialogue – rather than one-way communication in which information is sent down the line or requests sent up the line, with no guarantee they "get through," let alone are understood.

Principle #6 – Communications must be clear and understood.

* ***Use acknowledgments to close the loop –*** Whenever information is transmitted, especially by radio but also face-to-face, there should be an acknowledgment with varying amounts of feedback from the receiver to the sender. Both have responsibility to see that the loop is closed, with understanding. The basic idea is to follow a crew resource management (CRM)-like approach and related concepts in aviation communications, where, for example, changes in altitude directed from control tower to pilot are confirmed by the pilot, and where crew member-to-pilot, or pilot-to-crew member instructions get repeated.

For firefighting, acknowledgments can run from:

- Simply saying "Copied" to respond to a straightforward, non-safety related piece of information, to
- Repeating key elements of a message (such as saying, "Understood, dig line from the creek east"), to
- Repeating part of a complex instruction ("We are to continue digging line unless the wind shifts in our direction, and if that happens, will immediately retreat on the escape route to the east.")

A command and control organization tends to encourage "telling people" or "giving orders," with the assumption that the receiver understands. The key change recommended is to require confirmation of what is understood. This should be done for all non-trivial messages, with confirmations being terse so as not to overload radio channels. Training courses will have to be revised to reflect this and the other changes recommended for improving communications. Examples of good communication should be given explicitly or implicitly throughout the curriculum.

* ***Legitimize and encourage asking questions –*** In addition to feedback, another key change needed in the culture is making it easier for a subordinate to ask a supervisor or colleague about what one is supposed to do, or how one is to interpret information received. The acknowledgment process discussed above will help provide opportunities for people to ask questions about an assignment if it is unclear. But going further, it must be the ***sender's*** professional responsibility to ensure that a communication that could affect safety is received and understood. It must be the ***receiver's*** professional responsibility to ask questions about a communication that was not clearly heard or understood, or if implications of what to do are unclear. Specific techniques should be taught to supervisors on how to encourage querying, especially for supervisors of crews or teams that have not been together for long. It can be as simple as the supervisor saying something like this when the crew first meets: "We haven't worked together before, but once you get to know me you'll see that I appreciate being asked questions." Giving praise for good questions also encourages queries.

- ***Legitimize pointing out safety problems (and solutions) –*** It must be not only a right but an obligation for everyone from the newest member of a crew up through incident commanders to point out safety problems to their supervisors, and to report injuries, entrapments, and near misses. It should also be a responsibility to point out safer ways to accomplish a mission where possible. (This, too, is part of the Crew Resource Management concept used in aviation.) The culture should encourage raising safety issues and solutions in a "respectful interaction," in which one raises the issues politely with one's supervisor, and, if need be, with the next level up the line. Supervisors must not be allowed to punish someone for raising a

safety issue in a proper manner. Performance ratings should consider how well supervisors promote an open environment for addressing safety issues.

* ***Improve briefings –*** The content and orderliness of briefings in the field need to be improved. Special efforts also are needed to get adequate debriefings from crews or other units going off duty, and get the information to the units on duty. Checklists of things to cover in briefings should be provided (see examples in text). Here, too, the principal of two-way communications should apply: those receiving briefings who do not understand the situation or its implications need to take the initiative to ask questions.

- ***Ensure all crews have radios*** – There must be an adequate number of radios provided to each crew and a radio for each resource such as dozers. It is critical for safety to be able to keep in touch and coordinate all units. Some crews and other units have had too few radios or even none at all.

Human Factors

Many of the desired goals here deal with human factors – psychological, mental, and physical. In addition to the human factors inherent in the issues discussed above, more attention must be given to fatigue, crew dynamics and crew cohesion, and to accurately representing crew capability levels. Crews have been misused at times from lack of awareness of their fatigue level, their lack of training or lack of equipment. (Similar concerns apply to engine crews, single resources[8], and management teams.) Safety experts also believe that the degree of crew or team cohesion makes a significant difference in team decision making, response to leadership, and their ability to react appropriately in an emergency.

Principle #7 – Individuals and crews must not be used or pushed beyond their capability.

[8] "Single resources" are individuals such as division supervisors or dozer operators who are ordered up individually, as opposed to a crew or team, who are ordered up as unit.

* ***Prevent fatigue –*** Fatigue is a critical factor that can lead to illness directly, and to injuries through carelessness or bad decisions by people who are fatigued. It is one of the highest priorities to address. The agencies must deal directly with reducing fatigue levels. The Bureau of Indian Affairs (BIA) has found that 80 percent of injuries occur during the third week in the field; similar research should be done for all agencies, and the results communicated to all firefighters. Crews and teamwork/rest guidelines need to be revisited. The length of tours in the field should be reduced, perhaps to two weeks instead of three. Research should be undertaken on how work/rest cycles, including cumulative fatigue over a season, the number of consecutive days in the field, and the length of operational periods, affect the safety of wildland firefighters. Whatever work/rest guidelines are chosen, they must be enforced. Also, the quality of rest must be improved – reducing exposure to noise, light, heat, etc. – for people who are sleeping, especially those resting during the daytime after night operations. Lack of adequate rest should be considered at least as serious a safety problem as not having a hard hat or shelter.

- ***Accurately report fatigue, health, and equipment status –*** The condition of crews, Incident Management Teams, and single resources – including their fatigue, injury status, health, and equipment deficiencies – must be accurately and honestly communicated to whomever has to decide on their use. This is usually done but not always. It should be a grave offense for a Crew Supervisor, team leader, or single resource to misreport the condition of their unit when checking in. (Some well-publicized suspensions of violators may help make the point.) It is understandable that people want more work to earn more money, but it must not be at the expense of themselves or the people they lead. Pay systems should be revised so as not to be a factor in promoting fatigue. Candor in reporting status must also be encouraged among state and local career or volunteer firefighters who work on a Federal fire. Criteria need to be developed that describe crew status in a concise and useful way to those assigning them.

- ***Recognize differing capability among Type II crews –*** The competency as well as condition of resources must be considered in making assignments. In particular, there was a high level of concern among firefighters in every region about misuse of Type II crews. The training and experience of Type II crews vary widely. Some have equipment problems (e.g., a shortage of radios). Typing of crews must reflect performance that can be expected. It may be desirable to categorize crews using three types, as once was done, to facilitate making an appropriate assignment. Whatever categorization is used, the capability and status of a crew must be considered in giving them an assignment, because it affects their safety as well as their performance. The same holds true for assigning State and local fire agency crews, contract crews, and military crews.

Principle #8 – Unit cohesion should be fostered, and attention given to developing good crew dynamics.

- ***Explicitly build crew/team cohesion –*** Usually Type II crews (and occasionally some Incident Management Teams) are brought together for the first time at fires. Crew Supervisors, team leaders, and other managers/leaders should directly address the fact that they may be at times dealing with a group of strangers, or several clusters of people who know each other within their cluster but not the people in the other clusters. The leaders should systematically, purposefully build a team. One recommended approach is to explicitly raise this issue with the team, frankly discussing the need to get to know each other quickly. This will break down some of the communications barriers that make people reticent when they don't know other people in a group. Also helpful is to quickly establish a specific, identifiable role for each person on the crew, or squad, such as is done on Hotshot crews. New Incident Management Team members already have an identity by virtue of their specific, named position (e.g., finance section chief, operations section chief), but they, too, need explicit direction to quickly establish contact with those with whom they most interact. Beyond the very first meeting, there are many ways to promote team cohesion, and not just wait for time to solve the problem (as discussed in Chapter 5).

Promoting Safety as Part of Professionalism

It is difficult to promote safety directly without the effort sounding like "sloganeering" or lip service. A successful approach used in other dangerous occupations such as urban firefighting, race car driving, and aviation is to make the very concept of being a professional include being properly equipped with safety gear and exhibiting certain safety-related behaviors. The agencies need to define a core professional ethic – the behaviors that define professional conduct for all Federal wildland firefighters, regardless of whether they are full-time, seasonal, collateral duty, or EFF. They also need to expand the professional corps of firefighters around which to improve the program, and to improve the professionalism of collateral duty employees (the "militia"). The central corps of firefighters in Type I crews should set the example for the others by "doing it smart."

There is another link between the concept of professionalism and safety: recognizing firefighters as professionals contributes to their feeling appreciated, and will help in retention, which in turn builds experience and thereby increases safety.

Principle #9 – Develop an attitude and ethic of professionalism that encourages retention and promotes safety behaviors.

- ***Depict safety as the skill exercised by professionals –*** People engaged in firefighting or Incident Management Teams should be considered as professional firefighters in the field, regardless of their job title. Make safe behavior, taking precautions, wearing the proper protective clothing, using tools safely, maintaining situational awareness and communicating safety problems all part of what it means to be considered a professional. Professionals are obliged to report injuries and near-misses, point out safety problems, and suggest safer approaches. The idea is to change the culture to incorporate safe behavior as part of the essence of being professional – you can't get the job done if you get hurt.

  Firefighting must be viewed both by the agencies and by firefighters as a profession requiring skill, and fortitude, not just guts and risk taking. The Federal firefighters

of the future shall be proud that they made a smart assessment of their situation and that their assessment drove decisions along the way to success.

To help change the culture, spread stories that illustrate skill and risk management. Tell stories about real incidents to help people picture the inconceivable. Illustrate how a series of small, incremental problems can accumulate to a disaster. Reward ideas that contribute to safety without denigrating courage.

Two or three decades ago, urban firefighters were considered macho and professional if they went into burning buildings to rescue people without using breathing apparatus and wearing protective clothing. Today they would be considered foolish and unprofessional, unable to do their job effectively unless properly attired and equipped. Similarly, wildland firefighters need to have certain equipment and practice certain skills to be considered a professional. This theme needs to be included in training and all aspects of the culture.

Safety Incident Reporting

Adequate information on the causes of safety incidents is critical for targeting safety and measuring progress. It must be collected and widely disseminated. However, there does not yet exist reliable, comprehensive data on wildland firefighter injuries, near-misses, entrapments and shelter deployments. The number of fatalities is accurately reported, but investigations of them are not done consistently, nor are the underlying factors for safety incidents always identified. There is no consistency in reporting across all agencies.

Principle #10 – Collect reliable safety data, and use it to target, prioritize, and evaluate programs.

* ***Develop a comprehensive, multi-agency injury/near-miss reporting system –*** All injuries, entrapments, near misses and safety problems must be reported. It is almost inconceivable that a comprehensive data collection system is not yet available for accident, injury, or near-miss events across the agencies. There have been many false starts, and nothing brought to fruition. Definitions, reporting forms, and a system for collecting and analyzing injury data and near-

miss data need to be implemented consistently across all agencies. The resulting data must be analyzed and the results fed back into the appropriate training courses, on-the-job awareness, and elsewhere. An important component of the reporting system must be the ability for anonymous reporting of specific incidents, safety problems and information on near misses, as is done in aviation. We recommend that a new safety incident reporting system be one of the first tasks worked on, because it is critical for targeting and evaluating many of the other recommended strategies for improving safety. The data system should routinely publish summary reports of the findings, at least annually. The data system should also be a source for special reports on safety issues.

- ***Standardized interagency investigations –*** The investigation protocol for the more serious incidents needs to be standardized, and more importantly, broadened to capture key information needed for improvement of safety – especially the human factors. A draft protocol now exists. The investigations must include interviews of various people who were at the scene as to what took place and how the problem could have been avoided. Why the incident occurred needs to be explored as well as what happened. Lessons need to be drawn for the future, and the results disseminated through the newsletter mentioned earlier and/or by other means. The National Institute of Occupational Safety and Health in 1998 was given new responsibility and funding for investigating all types of firefighter fatalities, and there needs to be agreement on how the various agencies will coordinate undertaking fatality investigations.

External Factors

The safety of firefighters is affected by many factors beyond their control. On the Phase I survey more firefighters identified reducing the accumulated fuels in wildlands as high priority for improving their safety than any other factor. Accumulated fuels increase fire severity and complexity.

A second key external factor is the degree to which property owners safeguard their property. That affects fire incidence and the strategies needed for urban interface

fires, and thus can affect firefighter safety. A third external factor was inadequate fire program budgets, which reduce the level of resources available to fight fires, and increased pressures to do more with less.

Principle #11 – Promote prevention and fuel treatment programs for their impact on firefighter safety as well as for their land management results.

- ***Implement expanded fuel treatment and public education programs –*** The wildland firefighting culture must continue to promote and expand fuel treatment programs (both prescribed fire and mechanical approaches.) It must also increase public fire safety education. Both programs help prevent and mitigate the severity of wildland fires. They not only reduce losses, but also help prevent firefighter casualties. Wildland firefighters themselves need to be educated on the merits of fuel treatment and public education, and armed with arguments to help others understand the importance of these programs. Prevention programs are especially important for mitigating interface fires.

  The public must be educated not only on what they can do to mitigate losses, but also on the limitation of firefighters – and specifically that firefighters cannot be expected to sacrifice their own safety to protect homes in environments that are virtually indefensible if they lack certain design and landscaping features. A new, intense national public education program is needed to get these messages across. This might include taking more advantage of the "teachable moments" during large, nationally publicized fires.

Starting Actions on Implementation

To change the wildland firefighting culture will require more than an edict that comes out saying, "Do all this stuff." The driving moral force for these recommendations comes from the 1,000 firefighters who participated in Phase I, from numerous meetings with various safety and mid-management working teams and knowing that we can do better. The operational levels of the workforce – the firefighters, Crew Supervisors, Floss, District Rangers, and others – must be kept involved in the implementation process.

However, the senior fire management officials and Agency Administrators must be the ones to get the changes started.

The first step needed to move forward is for the five agency fire directors or their designees to develop an assignment matrix, with milestones and an individual or unit responsible for each implementation strategy. The report and implementation plan need widespread dissemination. Specific steps for moving forward with implementation are recommended in Chapter 7.

The fire directors, their immediate subordinates, and others on down the chain of leadership also must practice a series of small, incremental actions that demonstrate they care about safety, and that help guide the changes. This includes asking questions about safety implications of various programs as they are discussed, giving praise for steps taken in the right direction, spreading examples of serious problems or innovative solutions to problems, correcting memos, reports, and policies that further the status quo, pointing out changes in the way information is acknowledged, seeing that the needed training takes place, and doing their own on-the-job training with subordinates. In other words, show in a variety of ways that the multi-agency wildland firefighting establishment means business about changing the culture. As one firefighter who reviewed this report put it, "Higher level folks need to … show by where their feet take them what is truly important."

Each reader of this report and the rank and file firefighters shoulder responsibility to change the culture of safety in wildland firefighting. Each person must consider the recommendations, and their own part in the change process, leadership, and accountability for actions taken.

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The following table lists all of the goals and recommended implementation strategies. They are grouped under the relevant safety principle they addressed (18 principles in all, including three not discussed above.) Each goal and implementation strategy is discussed in the body of the report. Some goals apply to more than one principle, and some implementation strategies to more than one goal, but to avoid redundancy each is listed only once here; the text provides cross-referencing.